FIG.1

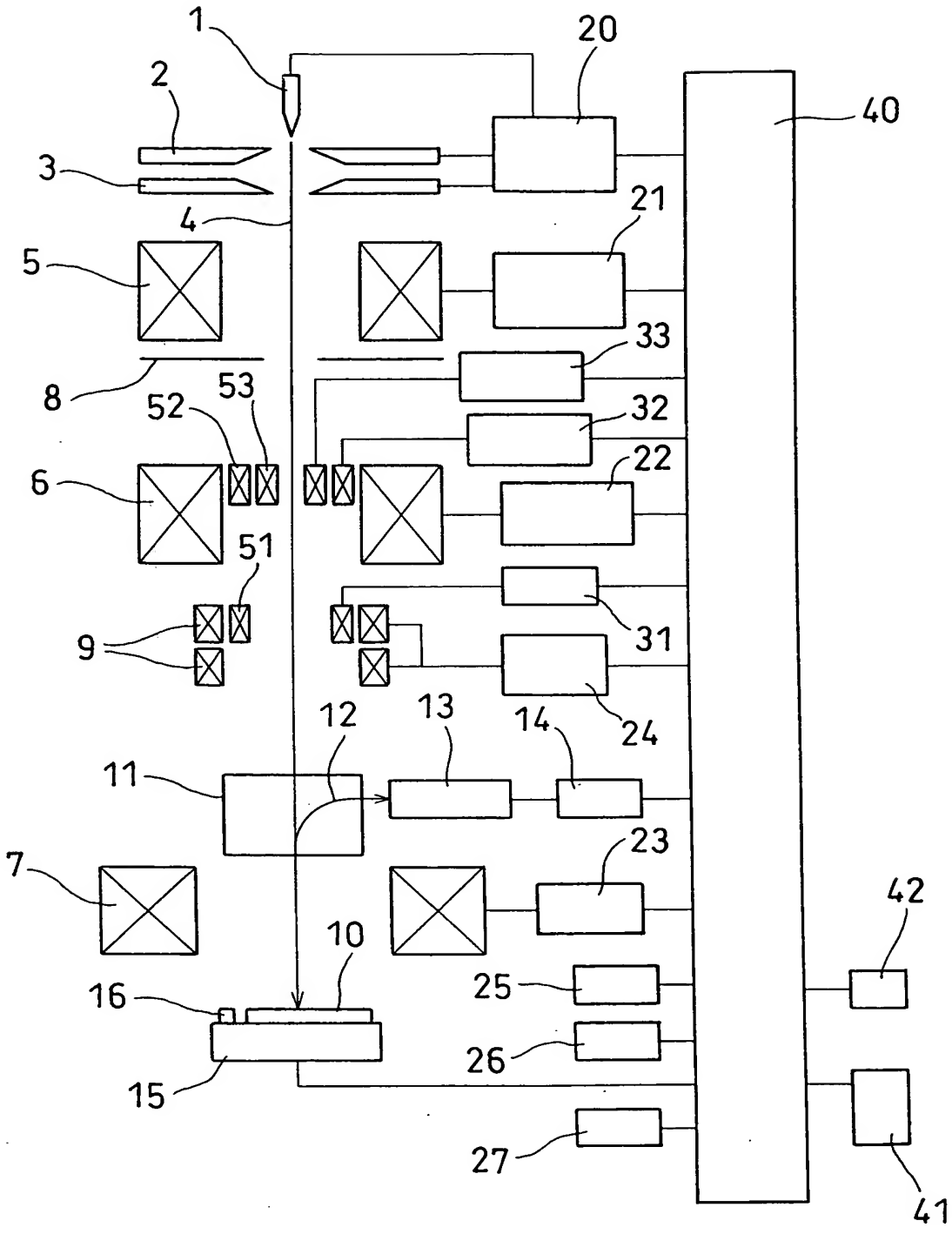

1
20
2
40
3
21
4
5
33
8
53
52
32
6
22
51
9
31
24
12
13
14
11
23
7
42
10
25
16
26
15
27
41

FIG.2

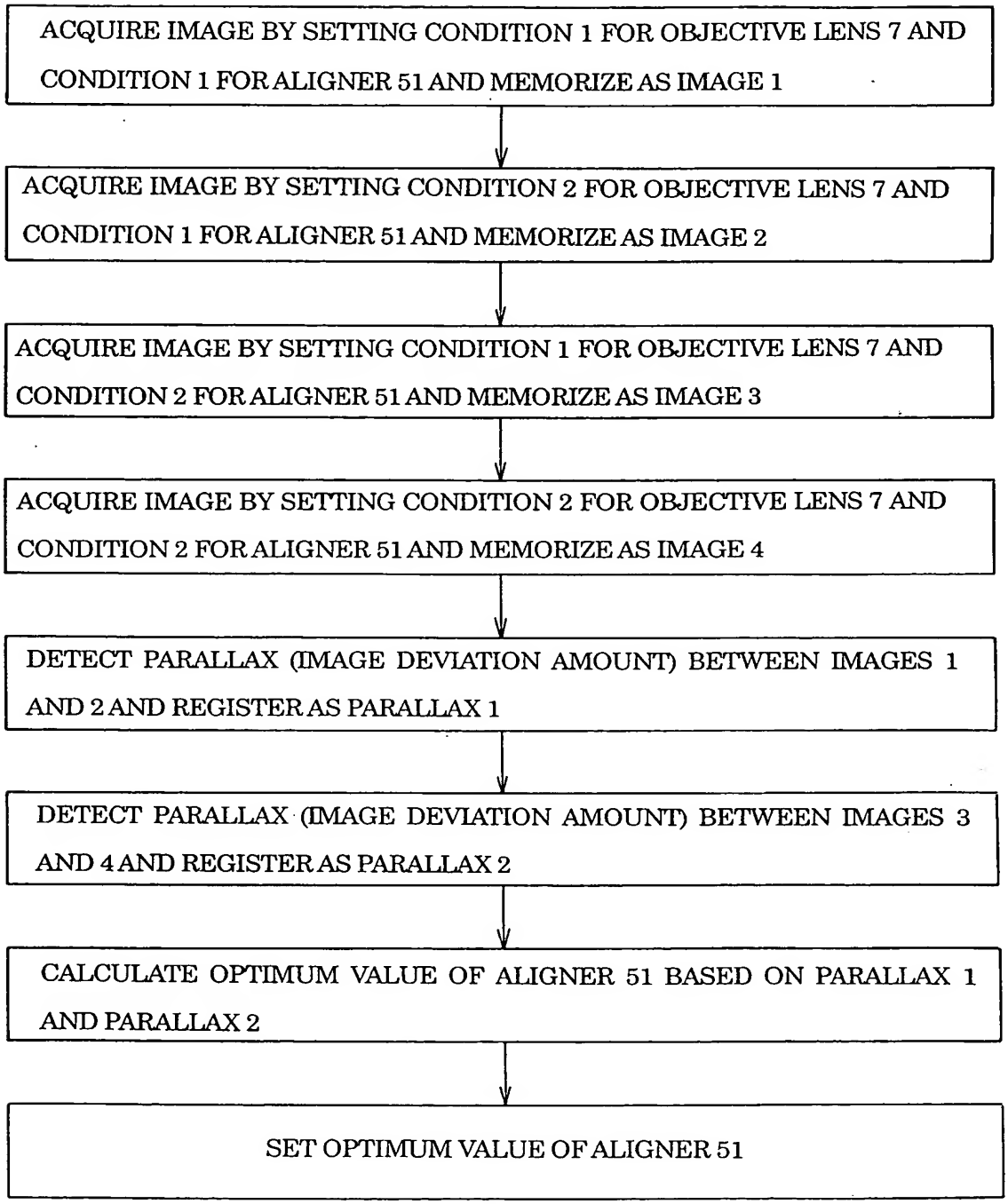

ACQUIRE IMAGE BY SETTING CONDITION 1 FOR OBJECTIVE LENS 7 AND CONDITION 1 FOR ALIGNER 51 AND MEMORIZE AS IMAGE 1
ACQUIRE IMAGE BY SETTING CONDITION 2 FOR OBJECTIVE LENS 7 AND CONDITION 1 FOR ALIGNER 51 AND MEMORIZE AS IMAGE 2
ACQUIRE IMAGE BY SETTING CONDITION 1 FOR OBJECTIVE LENS 7 AND CONDITION 2 FOR ALIGNER 51 AND MEMORIZE AS IMAGE 3
ACQUIRE IMAGE BY SETTING CONDITION 2 FOR OBJECTIVE LENS 7 AND CONDITION 2 FOR ALIGNER 51 AND MEMORIZE AS IMAGE 4
DETECT PARALLAX (IMAGE DEVIATION AMOUNT) BETWEEN IMAGES 1 AND 2 AND REGISTER AS PARALLAX 1
DETECT PARALLAX (IMAGE DEVIATION AMOUNT) BETWEEN IMAGES 3 AND 4 AND REGISTER AS PARALLAX 2
CALCULATE OPTIMUM VALUE OF ALIGNER 51 BASED ON PARALLAX 1 AND PARALLAX 2
SET OPTIMUM VALUE OF ALIGNER 51

FIG.3

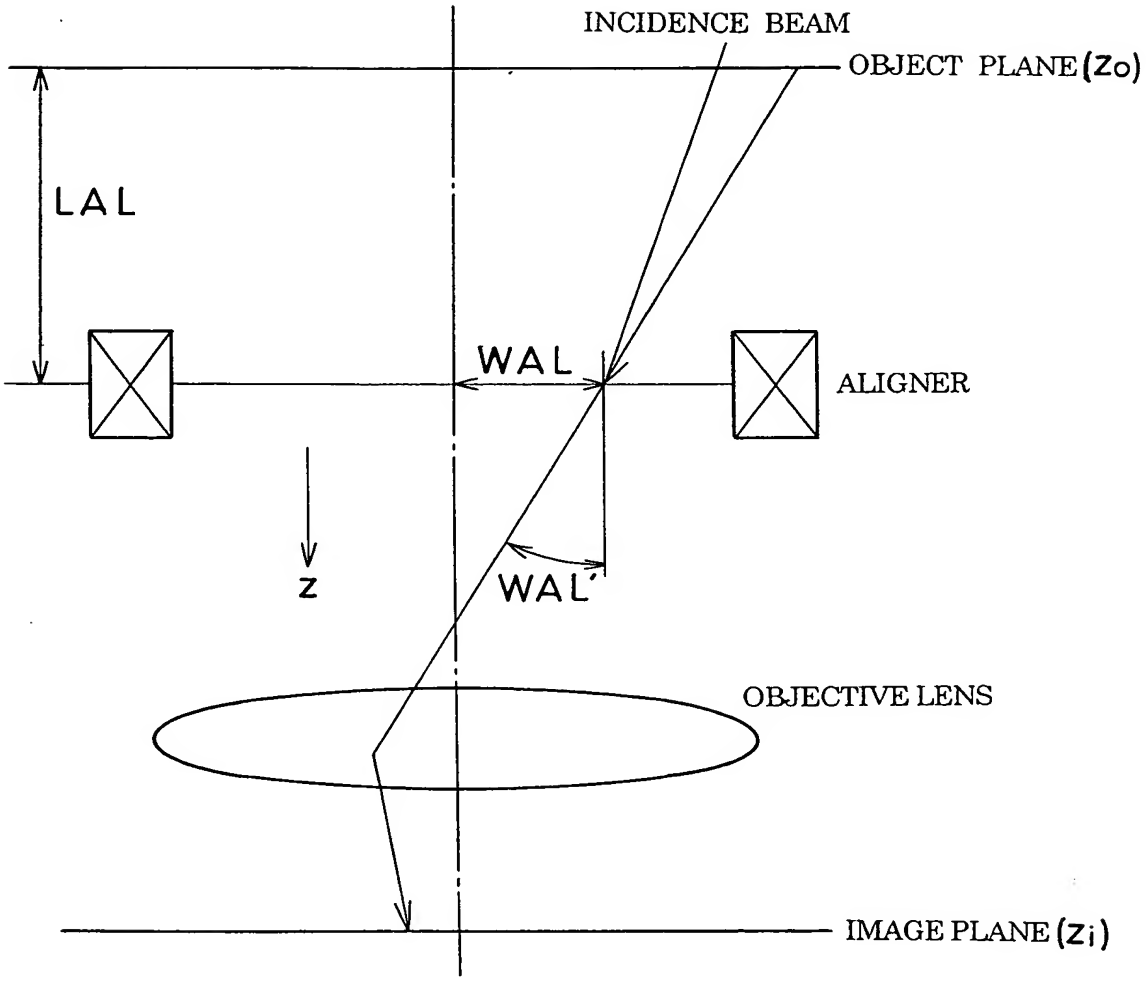

INCIDENCE BEAM
OBJECT PLANE (Zo)
LAL
WAL
ALIGNER
z
WAL'
OBJECTIVE LENS
IMAGE PLANE (Zi)

FIG.4

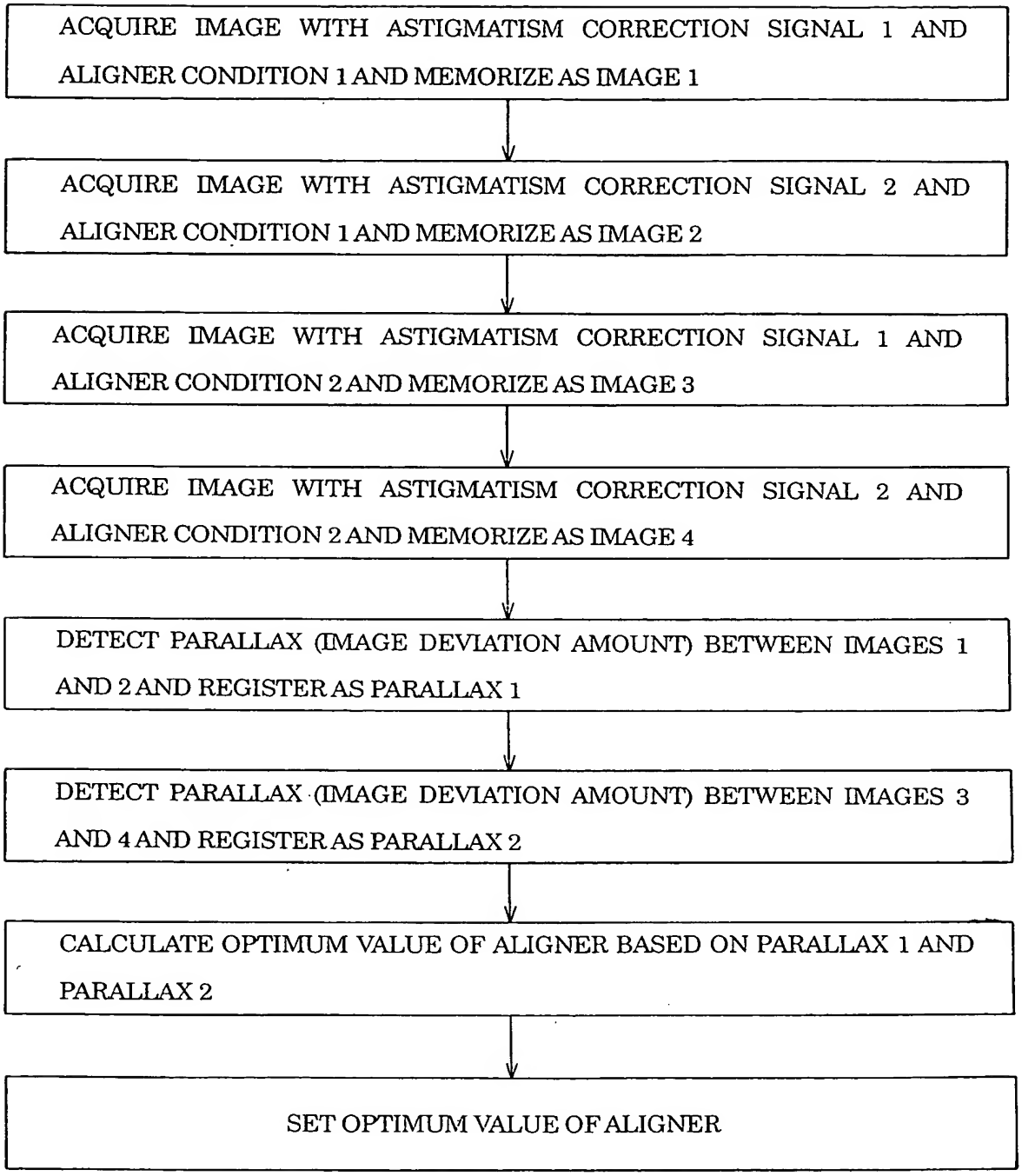

ACQUIRE IMAGE WITH ASTIGMATISM CORRECTION SIGNAL 1 AND ALIGNER CONDITION 1 AND MEMORIZE AS IMAGE 1
ACQUIRE IMAGE WITH ASTIGMATISM CORRECTION SIGNAL 2 AND ALIGNER CONDITION 1 AND MEMORIZE AS IMAGE 2
ACQUIRE IMAGE WITH ASTIGMATISM CORRECTION SIGNAL 1 AND ALIGNER CONDITION 2 AND MEMORIZE AS IMAGE 3
ACQUIRE IMAGE WITH ASTIGMATISM CORRECTION SIGNAL 2 AND ALIGNER CONDITION 2 AND MEMORIZE AS IMAGE 4
DETECT PARALLAX (IMAGE DEVIATION AMOUNT) BETWEEN IMAGES 1 AND 2 AND REGISTER AS PARALLAX 1
DETECT PARALLAX (IMAGE DEVIATION AMOUNT) BETWEEN IMAGES 3 AND 4 AND REGISTER AS PARALLAX 2
CALCULATE OPTIMUM VALUE OF ALIGNER BASED ON PARALLAX 1 AND PARALLAX 2
SET OPTIMUM VALUE OF ALIGNER

FIG.5

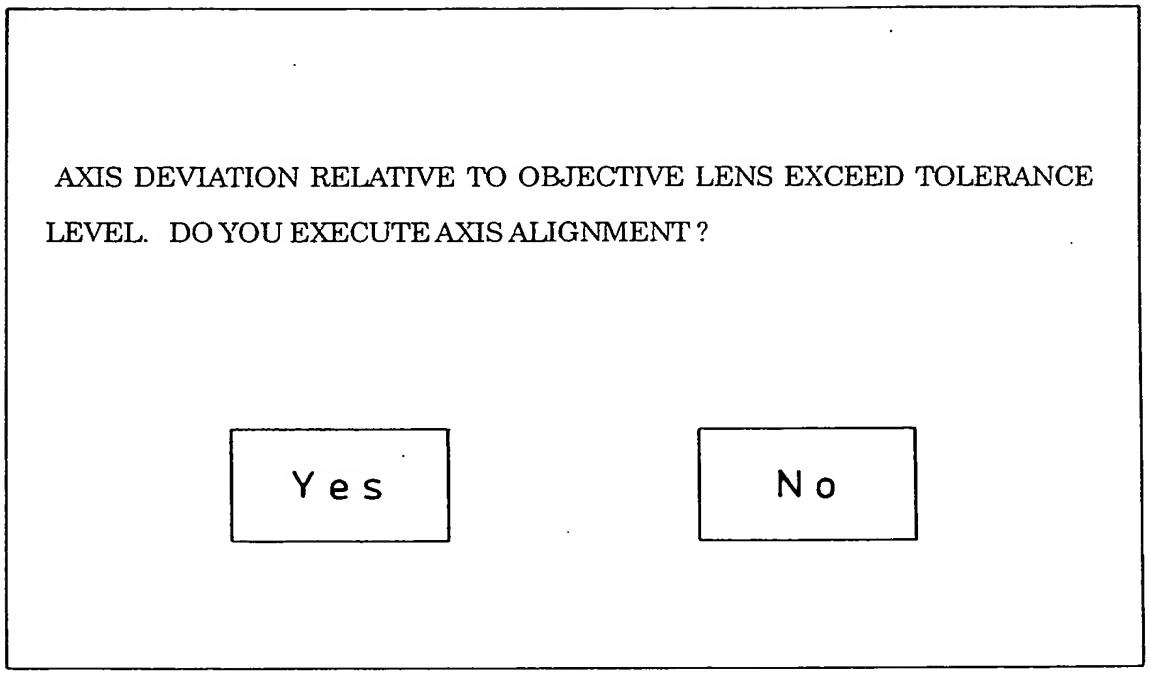

AXIS DEVIATION RELATIVE TO OBJECTIVE LENS EXCEED TOLERANCE LEVEL. DO YOU EXECUTE AXIS ALIGNMENT ?
Yes
No

FIG.6

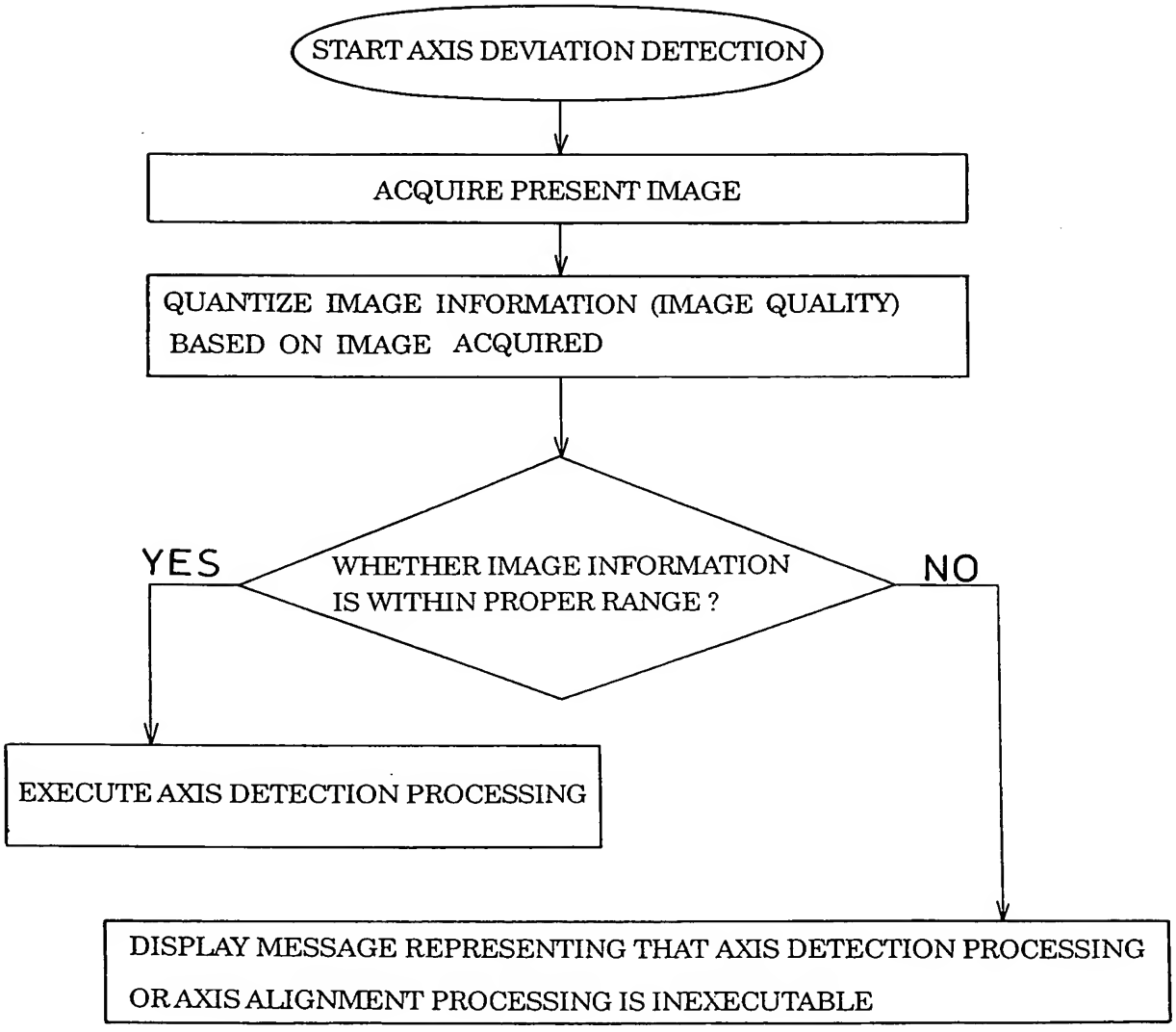

START AXIS DEVIATION DETECTION
ACQUIRE PRESENT IMAGE
QUANTIZE IMAGE INFORMATION (IMAGE QUALITY) BASED ON IMAGE ACQUIRED
WHETHER IMAGE INFORMATION IS WITHIN PROPER RANGE ?
YES
NO
EXECUTE AXIS DETECTION PROCESSING
DISPLAY MESSAGE REPRESENTING THAT AXIS DETECTION PROCESSING OR AXIS ALIGNMENT PROCESSING IS INEXECUTABLE

FIG.7

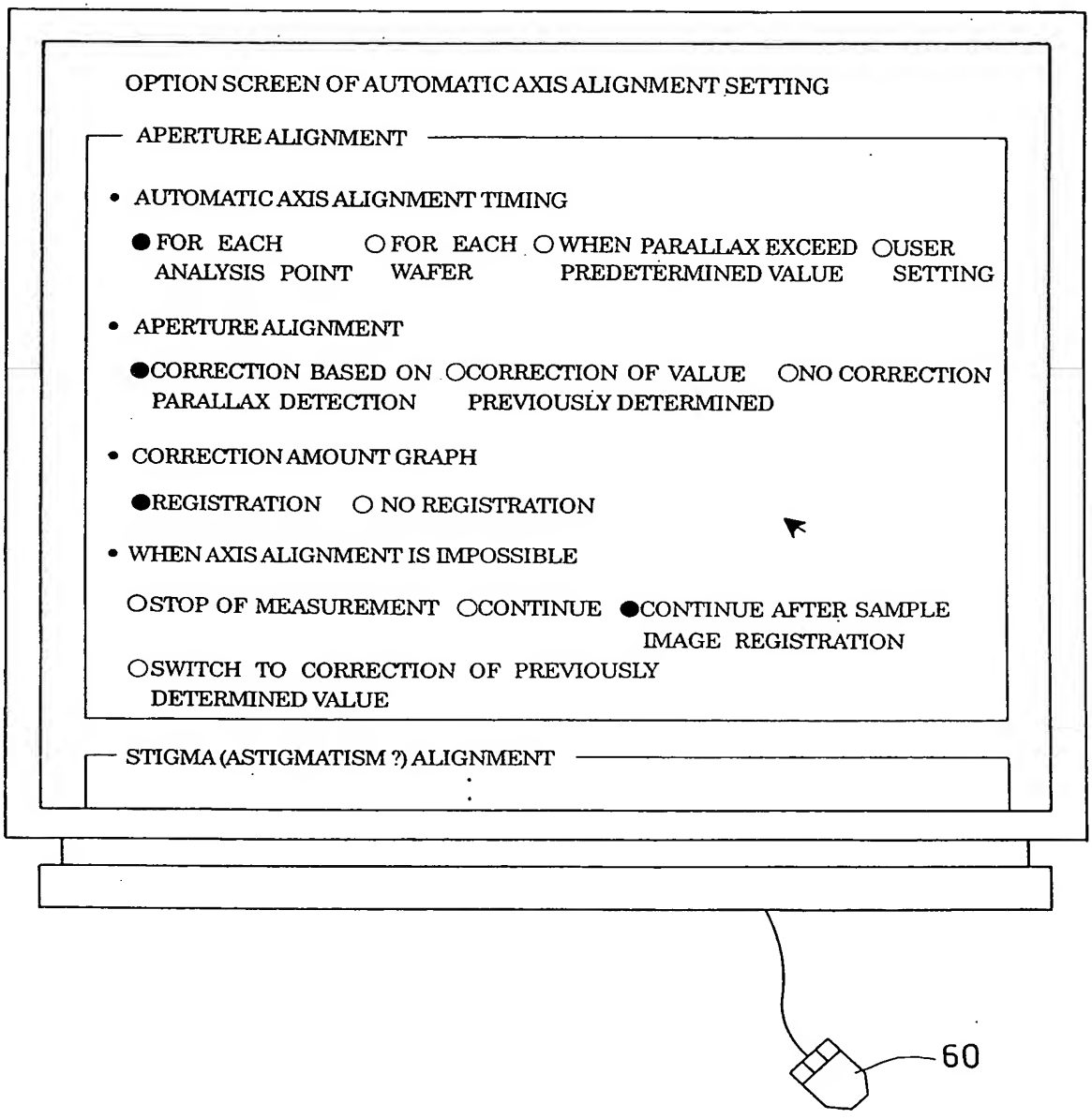

OPTION SCREEN OF AUTOMATIC AXIS ALIGNMENT SETTING
APERTURE ALIGNMENT
• AUTOMATIC AXIS ALIGNMENT TIMING
● FOR EACH ANALYSIS POINT
○ FOR EACH WAFER
○ WHEN PARALLAX EXCEED PREDETERMINED VALUE
○ USER SETTING
• APERTURE ALIGNMENT
●CORRECTION BASED ON PARALLAX DETECTION
○CORRECTION OF VALUE PREVIOUSLY DETERMINED
○NO CORRECTION
• CORRECTION AMOUNT GRAPH
●REGISTRATION
○ NO REGISTRATION
• WHEN AXIS ALIGNMENT IS IMPOSSIBLE
○STOP OF MEASUREMENT
○CONTINUE
●CONTINUE AFTER SAMPLE IMAGE REGISTRATION
○SWITCH TO CORRECTION OF PREVIOUSLY DETERMINED VALUE
STIGMA (ASTIGMATISM ?) ALIGNMENT
60

FIG.8 (a)

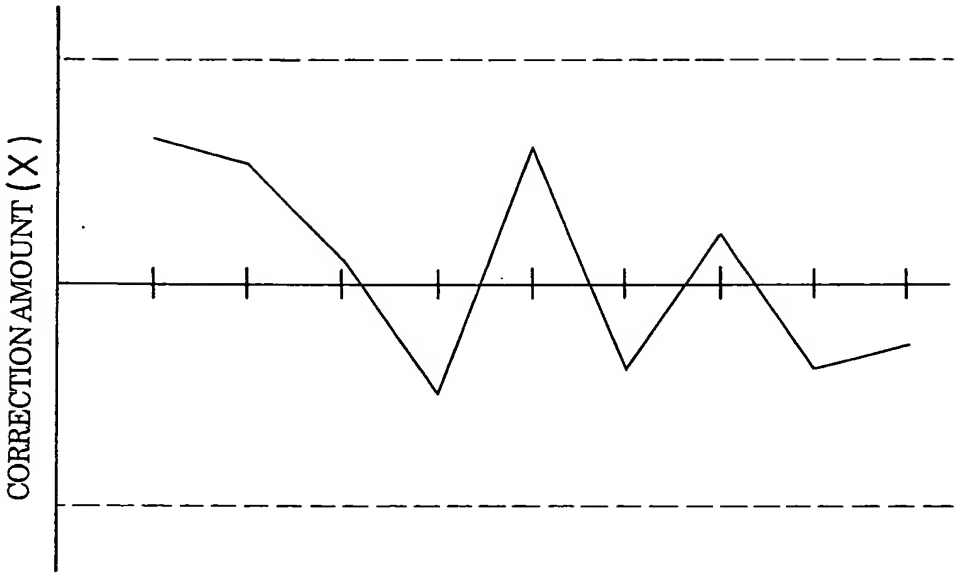


FIG.8 (b)

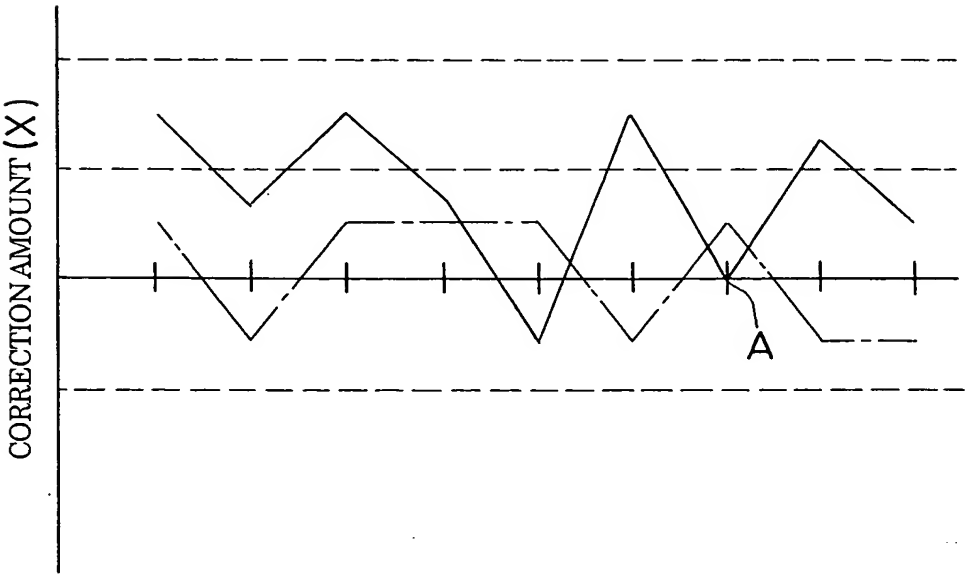


FIG.9

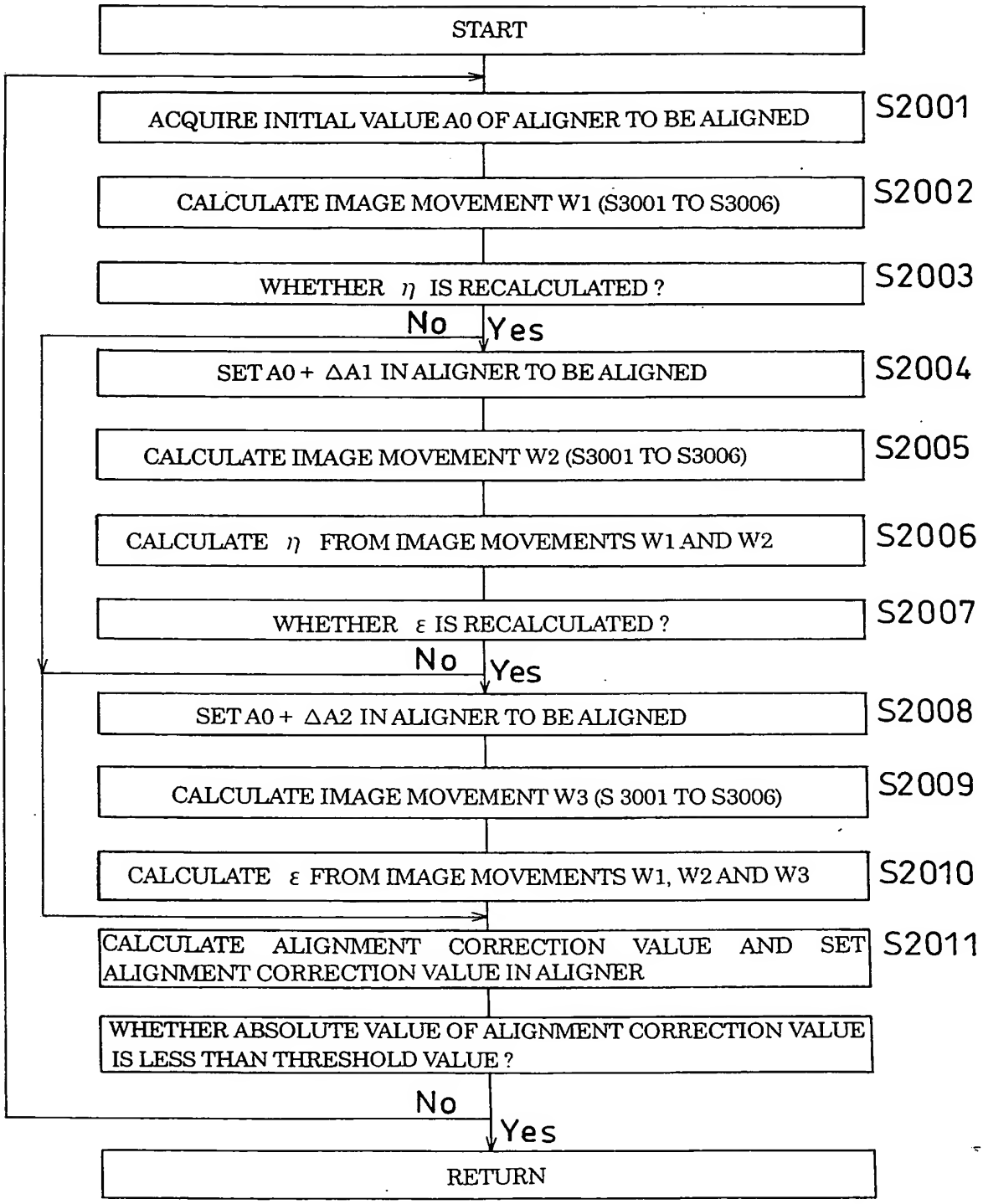

START
ACQUIRE INITIAL VALUE A0 OF ALIGNER TO BE ALIGNED
S2001
CALCULATE IMAGE MOVEMENT W1 (S3001 TO S3006)
S2002
WHETHER η IS RECALCULATED ?
S2003
No
Yes
SET A0 + ΔA1 IN ALIGNER TO BE ALIGNED
S2004
CALCULATE IMAGE MOVEMENT W2 (S3001 TO S3006)
S2005
CALCULATE η FROM IMAGE MOVEMENTS W1 AND W2
S2006
WHETHER ε IS RECALCULATED ?
S2007
No
Yes
SET A0 + ΔA2 IN ALIGNER TO BE ALIGNED
S2008
CALCULATE IMAGE MOVEMENT W3 (S 3001 TO S3006)
S2009
CALCULATE ε FROM IMAGE MOVEMENTS W1, W2 AND W3
S2010
CALCULATE ALIGNMENT CORRECTION VALUE AND SET ALIGNMENT CORRECTION VALUE IN ALIGNER
S2011
WHETHER ABSOLUTE VALUE OF ALIGNMENT CORRECTION VALUE IS LESS THAN THRESHOLD VALUE ?
No
Yes
RETURN

FIG.10

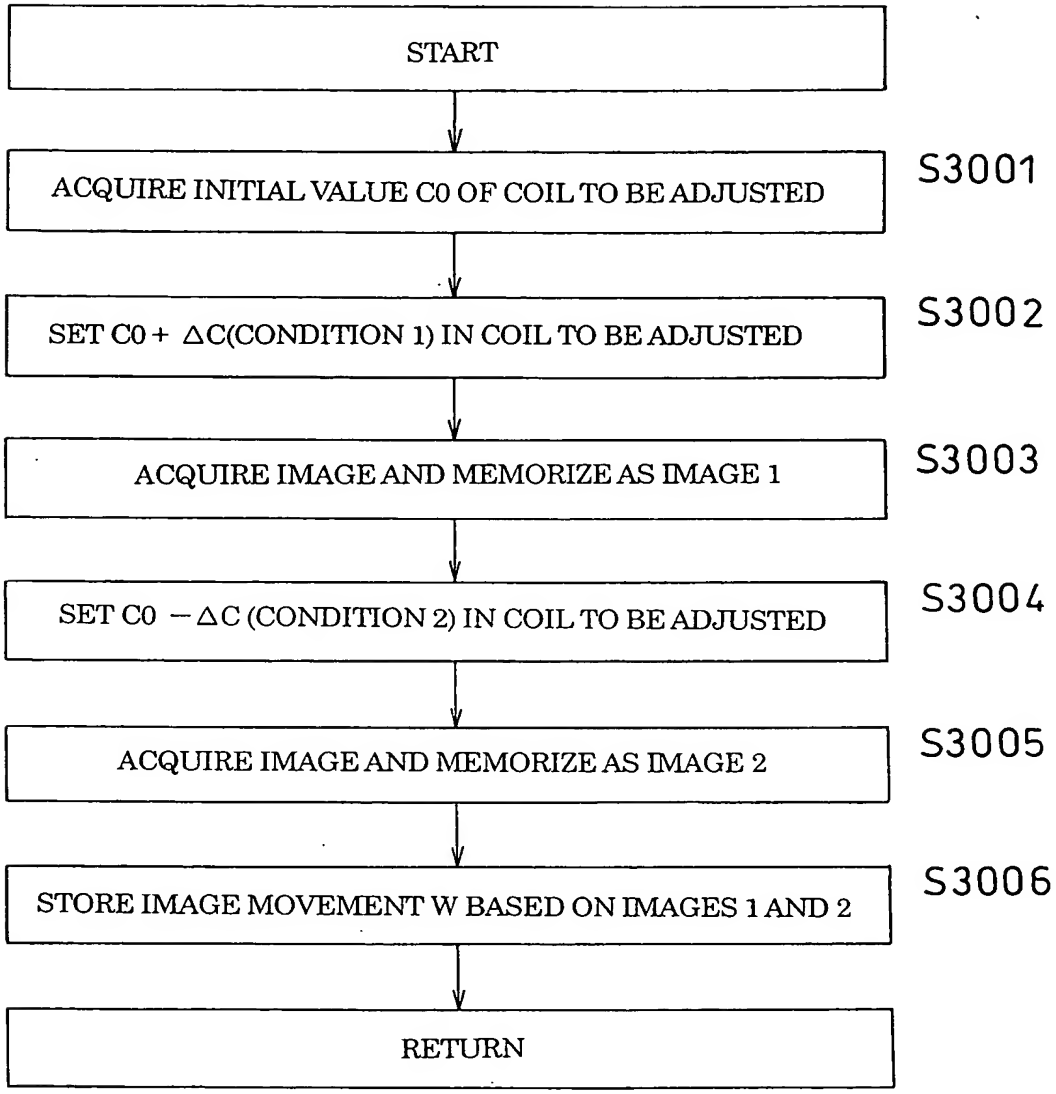

START
ACQUIRE INITIAL VALUE C0 OF COIL TO BE ADJUSTED
S3001
SET C0 + ΔC(CONDITION 1) IN COIL TO BE ADJUSTED
S3002
ACQUIRE IMAGE AND MEMORIZE AS IMAGE 1
S3003
SET C0 −ΔC (CONDITION 2) IN COIL TO BE ADJUSTED
S3004
ACQUIRE IMAGE AND MEMORIZE AS IMAGE 2
S3005
STORE IMAGE MOVEMENT W BASED ON IMAGES 1 AND 2
S3006
RETURN

FIG.11

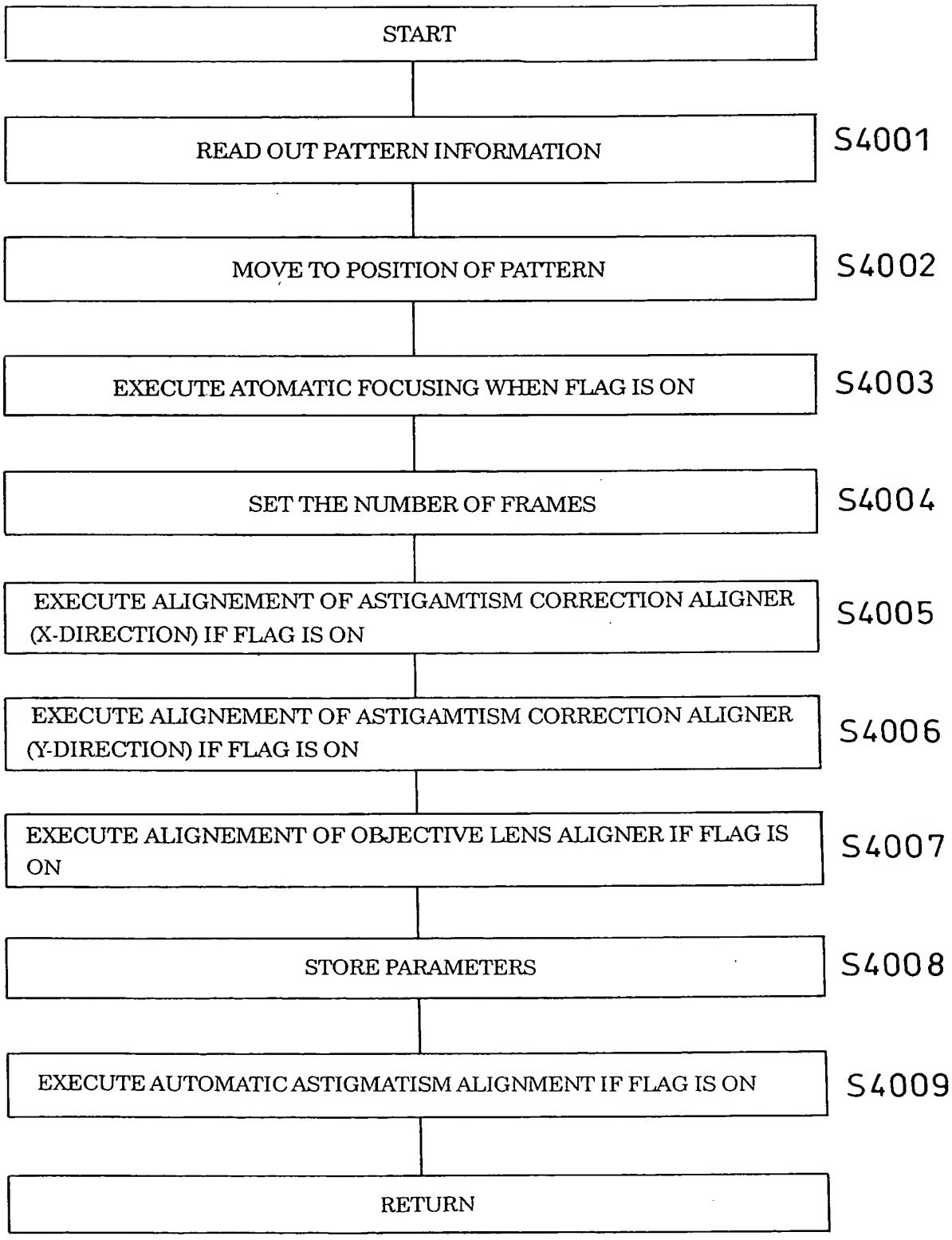

START
READ OUT PATTERN INFORMATION
S4001
MOVE TO POSITION OF PATTERN
S4002
EXECUTE ATOMATIC FOCUSING WHEN FLAG IS ON
S4003
SET THE NUMBER OF FRAMES
S4004
EXECUTE ALIGNEMENT OF ASTIGAMTISM CORRECTION ALIGNER (X-DIRECTION) IF FLAG IS ON
S4005
EXECUTE ALIGNEMENT OF ASTIGAMTISM CORRECTION ALIGNER (Y-DIRECTION) IF FLAG IS ON
S4006
EXECUTE ALIGNEMENT OF OBJECTIVE LENS ALIGNER IF FLAG IS ON
S4007
STORE PARAMETERS
S4008
EXECUTE AUTOMATIC ASTIGMATISM ALIGNMENT IF FLAG IS ON
S4009
RETURN

FIG.12

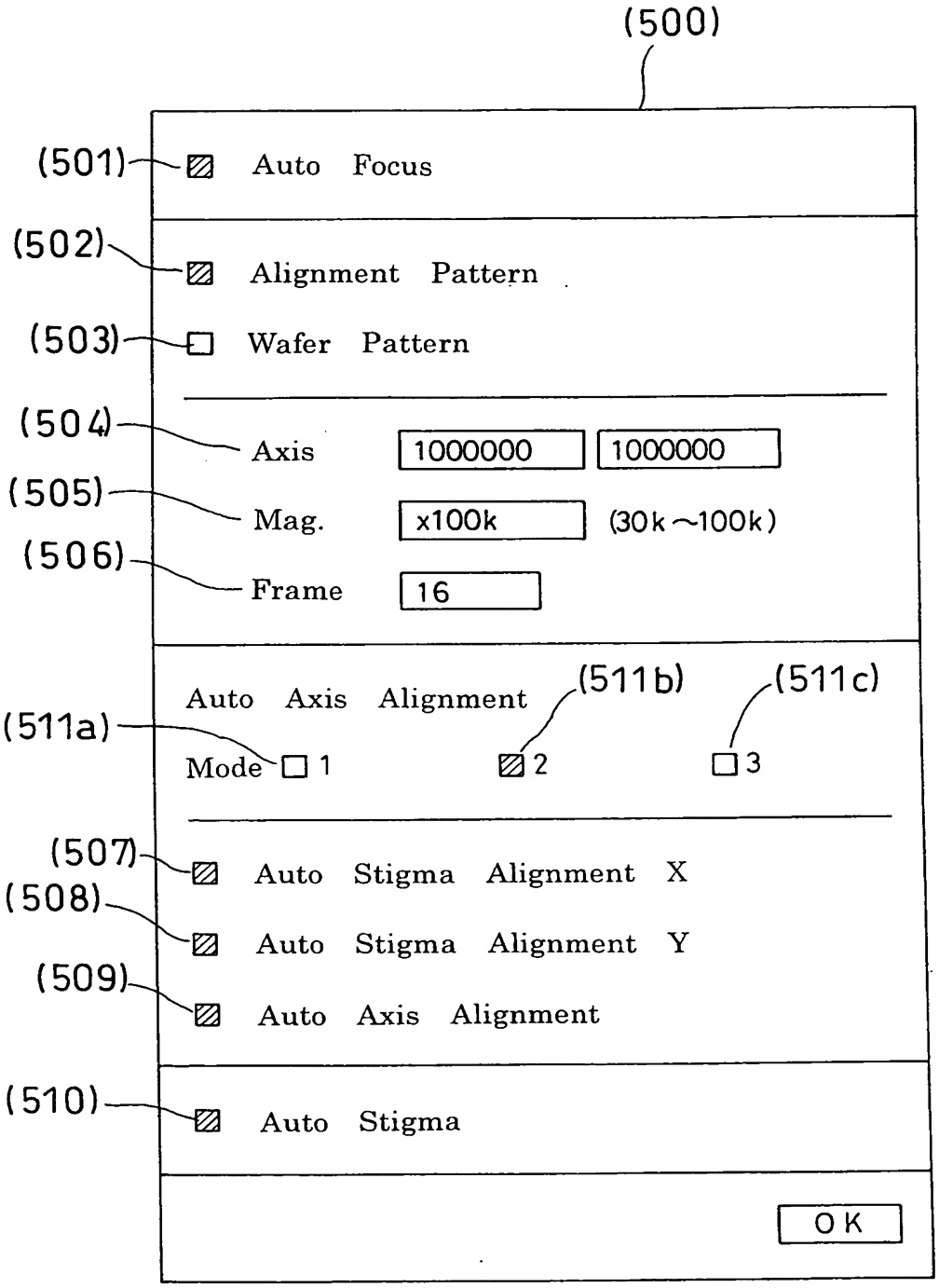
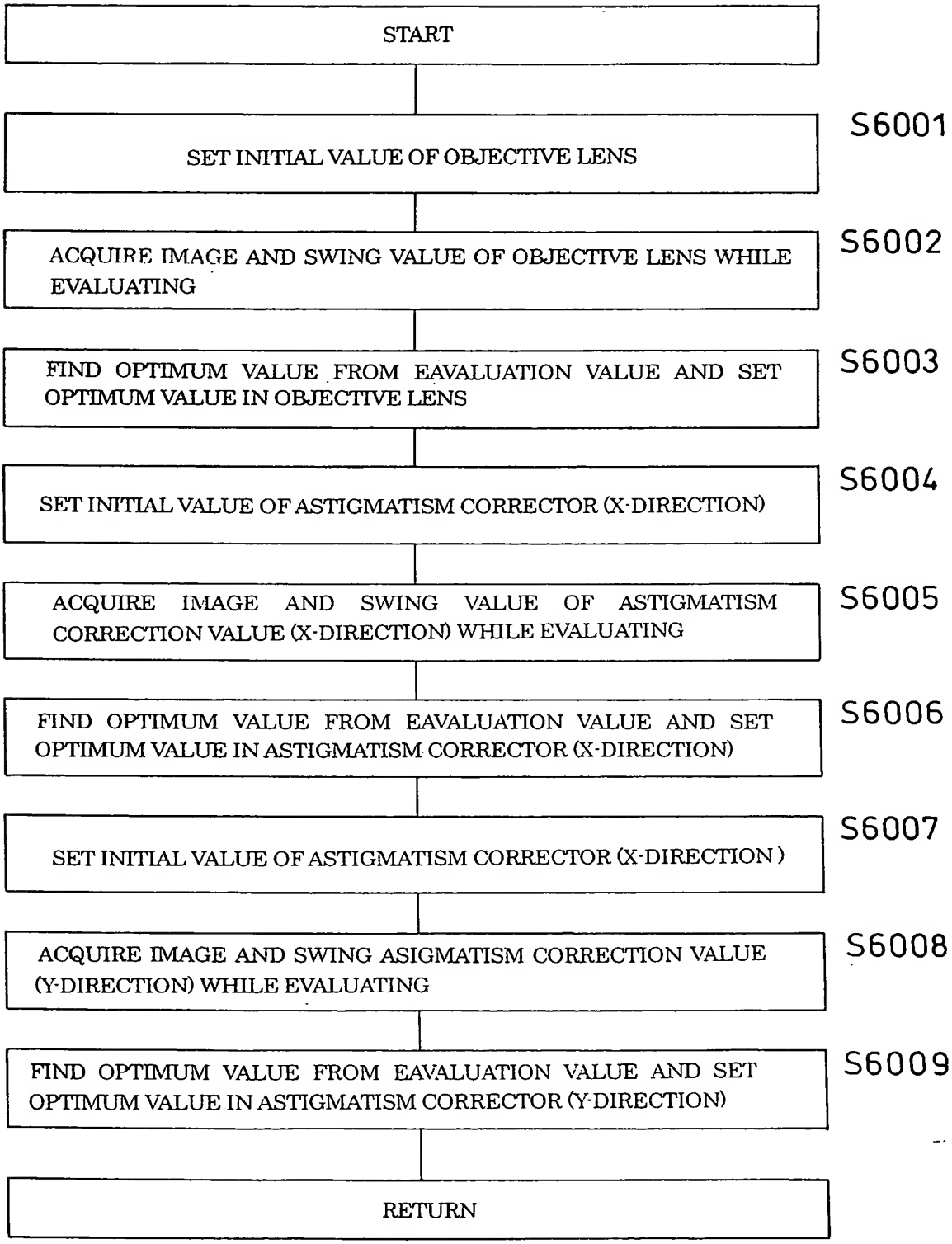

(500)
(501)
Auto Focus
(502)
Alignment Pattern
(503)
Wafer Pattern
(504)
Axis
1000000
1000000
(505)
Mag.
x100k
(30k～100k)
(506)
Frame
16
Auto Axis Alignment
(511b)
(511c)
(511a)
Mode
1
2
3
(507)
Auto Stigma Alignment X
(508)
Auto Stigma Alignment Y
(509)
Auto Axis Alignment
(510)
Auto Stigma
OK

FIG.13


START
SET INITIAL VALUE OF OBJECTIVE LENS
S6001
ACQUIRE IMAGE AND SWING VALUE OF OBJECTIVE LENS WHILE EVALUATING
S6002
FIND OPTIMUM VALUE FROM EAVALUATION VALUE AND SET OPTIMUM VALUE IN OBJECTIVE LENS
S6003
SET INITIAL VALUE OF ASTIGMATISM CORRECTOR (X-DIRECTION)
S6004
ACQUIRE IMAGE AND SWING VALUE OF ASTIGMATISM CORRECTION VALUE (X-DIRECTION) WHILE EVALUATING
S6005
FIND OPTIMUM VALUE FROM EAVALUATION VALUE AND SET OPTIMUM VALUE IN ASTIGMATISM CORRECTOR (X-DIRECTION)
S6006
SET INITIAL VALUE OF ASTIGMATISM CORRECTOR (X-DIRECTION)
S6007
ACQUIRE IMAGE AND SWING ASIGMATISM CORRECTION VALUE (Y-DIRECTION) WHILE EVALUATING
S6008
FIND OPTIMUM VALUE FROM EAVALUATION VALUE AND SET OPTIMUM VALUE IN ASTIGMATISM CORRECTOR (Y-DIRECTION)
S6009
RETURN